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October 26, 2007
Kleinfelder Project No. 88861

State of Idaho
Division of Environmental Quality
1410 N. Hilton
Boise, Idaho 83706

Attention: Mr. Kevin Schilling

Subject: Modeling Protocol Submittal
Dry Creek Dairy
Hansen, Idaho

Dear Mr. Schilling:

Enclosed is a proposed air quality modeling protocol for a client constructing a manure digester for a Dry Creek Dairy near Hansen, Idaho. The bio-gas from the digester will fuel three electrical generators. The modeling will support a Permit to Construct application for the generators.

We appreciate your review of the protocol. Please feel free to call me at 893-9700 x221 with any questions.

Respectfully,

KLEINFELDER WEST, INC.

Andrew Marshall, PE
Environmental Department Manager

Enclosure: Modeling Protocol

cc: Kyle Juergens, Andgar

88861/BOI7R052

KLEINFELDER

AMBIENT AIR QUALITY MODELING PROTOCOL for ANDGAR CORPORATION, DRY CREEK DAIRY HANSEN, IDAHO

October 26, 2007

Kleinfelder Project Number: 88861

Prepared for:

ANDGAR CORPORATION
6920 Salishan Pkwy. A-102
Ferndale, Washington 98248

AMBIENT AIR QUALITY MODELING PROTOCOL for ANDGAR CORPORATION, DRY CREEK DAIRY
2952 North 4200 East
Hansen, Idaho 83334

Kleinfelder Job No: 88861

Prepared by:

Andrew Marshall, P.E.
Environmental Department Manager

Reviewed by:

Ryan McDermott
Geotechnical Department Manager

October 26, 2007

KLEINFELDER WEST, INC.
2315 S. Cobalt Point Way
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TABLE OF CONTENTS

1 EXECUTIVE SUMMARY

The Andgar Corporation is preparing a Permit to Construct (PTC) application on behalf of the Dry Creek Dairy located near Hansen, Idaho. The Project includes the installation of an anaerobic digester for processing onsite cow manure and three Genset electrical generators for conversion of the digester biogas to electricity.

The proposed Genset electrical generators will result in criteria pollutant emissions of carbon monoxide, particulate matter, nitrogen oxides, sulfur dioxide and volatile organic compounds.

The proposed project will also result in potential emissions of non-carcinogenic toxic air pollutants ("TAPs") listed in IDAPA 58.01.01.585 including acrolein, isomers of xylene, styrene, toluene, and trichloroethylene. These potential emissions will not exceed their respective listed TAP screening emission levels ("EL"). In addition, the digester will result in potential emissions of carcinogenic TAPs listed in IDAPA 58.01.01.586 including acetaldehyde, benzene, dichloromethane, formaldehyde, dichloroethylene, and vinyl chloride. The potential emissions for acetaldehyde and trichloroethylene will not exceed the listed TAP EL, however potential emissions for benzene, dichloromethane, formaldehyde and vinyl chloride will exceed each of there respective TAP EL. Modeling will be required for these specific TAPs to demonstrate compliance with the Acceptable Ambient Concentration (AAC) or each pollutant.

This ambient air quality modeling protocol ("protocol") is being submitted to the Idaho Department of Environmental Quality Air Quality Division ("IDEQ") for review with the PTC application. The Protocol was prepared consistent with the IDEQ Air Quality Modeling Guidelines ("Guidelines"), revised December 31, 2002, and the associated modeling protocol checklist (see Appendix B). The protocol addresses the approach for assessing the ambient air impacts from the proposed source emissions for comparison with the AAC for TAPs and National Ambient Air Quality Standards (NAAQS) for $PM_{10}/PM_{2.5}$.

We understand that IDEQ staff will review and approve the modeling protocol. If there are any questions or items of discussion, the following points of contact are available:

Andgar Corporation:

Mr. Kyle Juergens
6920 Salishan Pkwy. A-102
Ferndale, Washington 98248
(360) 366-9900
e-mail: kylej@andgar.com

Kleinfelder:

Mr. Andy Marshall
2315 S. Cobalt Point Way
Meridian, Idaho 83642
(208) 893-9700
e-mail: amarshall@kleinfelder.com

2 INTRODUCTION AND PURPOSE

2.1. General Overview

Andgar Corporation is proposing to construct an anaerobic digester at Dry Creek Dairy. The facility operates under SIC code 1629. The digester is designed to produce biogas from on-site dairy cattle manure. The resulting biogas will be combusted in three on-site generators that will be used for primary electrical production for the facility and be sold to the local utility.

Dry Creek Dairy is defined as a minor source because the potential to emit is less than major source thresholds without requiring limits on its potential to emit.

The facility is located in Twin Falls County, Idaho which is designated as attainment or unclassifiable for criteria pollutants. The approximate center point of the property is located at UTM 4700693 N by 728651 E, Zone 11. The dairy sits on 13,000 acres and the surrounding area is a sparsely populated, rural area with terrain at about 4,200 feet above mean sea level (MSL). A Site Location Map, Vicinity Map and Facility Layout Map are respectively provided as Figures A-1 through A-3 in Appendix A.

2.2. Project Overview

Dry Creek Dairy plans to submit a permit to construct ("PTC") to allow for the construction of a proposed new air emission source. The anaerobic digester produces biogas from the anaerobic degradation of cattle manure. The biogas is directed to three Genset electrical generators to produce electricity. The three generators can operate independently or simultaneously. The electricity will be sold to the local utility. A PTC application will be submitted in support of the permitting for this new air emission source.

3 EMISSION AND SOURCE DATA

3.1. Facility Processes and Emission Controls Affected

The nature of the proposed source is to allow for the production of electricity. Since this is Dry Creek Dairy's initial PTC, existing facility processes or emission controls will not be affected.

3.2. Emission Points and Future Emission Rates

The potential emission rates that will be included in the PTC application for the proposed source are summarized in Table 3-1. Emission calculations for the proposed project are provided in Appendix C.

Table 3-1: Potential Emission Rates for Genset Generators

Pollutant	PTE (lbs/hr)	PTE (tons/yr)
PM_{10}	0.21	0.91
SO_2	11.3	49.3
NO_x	6.99	30.60
CO	15.36	67.29
VOC	6.99	30.60
Acetaldehyde	1.2E-03	5.3E-03
Acrolein	5.4E-04	2.4E-03
Benzene	1.4E-02	6.3E-02
Dichloromethane	2.1E-03	9.1E-03
Formaldehyde	3.6E-02	1.6E-01
Isomers of Xylene	2.8E-03	1.2E-02
Styrene	1.1E-03	4.8E-03
Toluene	5.5E-03	2.4E-02
Trichloroethylene	4.2E-04	1.8E-03
Vinyl Chloride	1.2E-03	5.1E-03

There are three Genset electrical generators proposed to be installed adjacent to each other. Each generator has its own 12-inch (0.305 meters) diameter stack extending 20 feet (6.1 meters) above ground. The emissions presented in Table 3-1 represent the total potential emissions if all generators were operating simultaneously at capacity. In an emergency situation the biogas will be flared from the digestor. During a flare event the emission characteristics and potential emission rate will be the same as the emission estimate from the Genset generators.

3.3. Good Engineering Practice (GEP) Stack-height Analysis

The exhaust stack from the genset generators is 20 feet (6.1 meters) in height. Because the stack height is less than 65 meters and is located in simple terrain, the GEP stack-height analysis requires the use of the actual stack height in calculating emission limitations.

3.4. Facility Layout

The facility layout is provided in Figure 3, Appendix A. As shown, the new planned anaerobic digester and biogas electrical generators will be located at the street address 2952 N 4200 E, Hansen, Idaho. The site is northeast of the intersection of N 4200 E and 2900 Road N. The dairy property includes approximately 13,000 acres. Approximately 2,000 (610 meters) feet west of the emission source is Twin Falls county road N 4200 E. This road is the nearest public receptor to the source. There is an existing house located on the property that is owned by the dairy.

3.5. Source Parameters

The source parameters for the proposed anaerobic digester are summarized in Table 3-2.

Table 3-2 Source Parameters

Point Source of Criteria Pollutants

Model Source Parameters

Source Description	UTM E	UTM N	Stack Height (m)	Stack Diameter (m)	Stack Velocity (ft/sec)	Stack Temp (Deg K)	Receptor Distance (m)
3-Guascor 560 generators	728651	4700693	6.1	0.305	27.8 m/sec	628	610

Model Emission Rates

Criteria Pollutant	Emission Rate (ton/yr)	Emission Rate (g/s)
PM_{10}	0.91	0.026
$PM_{2.5}$	0.91	0.026
NO_x	30.6	0.88
SO_2	49.3	1.42
CO	67.29	1.94
Lead	0	0.00

Table 3-2 Source Parameters (Continued)

Point Sources of TAPs

Model Emission Rates

TAP	Emission Rate (lb/hr)	Emission Rate (g/s)
Acetaldehyde	1.2E-03	1.5E-04
Acrolein	5.4E-04	6.8E-05
Benzene	1.4E-02	1.8E-03
Dichloromethane	2.1E-03	2.6E-04
Formaldehyde	3.6E-02	4.5E-03
Isomers of Xylene	2.8E-03	3.6E-04
Styrene	1.1E-03	1.4E-04
Toluene	5.5E-03	6.9E-04
Trichloroethylene	4.2E-04	5.2E-05
Vinyl Chloride	1.2E-03	1.5E-04

3.6. Methodology for Including Area and Volume Sources

The new proposed source will be modeled as a point source. Since the proposed generators are the only point source of emissions, no other sources were considered in the modeling analysis.

3.7. Methodology for Including/Excluding Sources from the Modeling Analysis

We did not include the digestor flares in the modeling analysis. The use of the flares would only occur in an upset condition and the characteristics of the emissions will be the same as the characteristics of the generator emissions. Including the flares will not have any substantial impact on the modeling results.

4 AIR QUALITY MODELING METHODOLOGY

4.1. Model Selection and Justification

The emission rates from the proposed source exceed the modeling thresholds for criteria pollutants requiring ambient air quality modeling for the proposed source. To properly demonstrate compliance with the ambient air quality standards, the SCREEN3 model was chosen to assess the potential air quality impacts from the project. This model was chosen since the facility consists of a simple terrain and simple and isolated emission source. SCREEN3 uses worst case meteorological conditions to estimate worst case emissions.

4.2. Model Setup and Application

The SCREEN3 model was set up following the EPA Guidelines and generally recommended procedures. The modeling options are kept as regulatory default. The inputs included are listed in Table 3-2.

4.3. Land-use Analysis

Following the land–use classification procedure provided in Appendix E of the IDEQ Modeling Guidelines, the area within 3km of the site has been classified as rural. The majority of the 3km radius around the Dry Creek Dairy is largely agricultural or undeveloped, with the ground cover being mostly wild grasses, weeds and shrubs, and sparsely located trees.

4.4. Building Downwash

The regulatory building downwash option will be used in SCREEN3. The building housing the genset electrical generators has a height of 4.27 meters, a minimum horizontal dimension of 30.5 meters and a maximum horizontal dimension of 15.2 meters.

4.5. Terrain Options

The terrain surrounding Dry Creek Dairy is relatively flat. The surrounding terrain generally is not greater than the stack base elevation. The flat terrain option was selected for the model.

4.6. Choice of Meteorology

The full meteorology option was selected as a worst case scenario for meteorological conditions. This includes all stability classes and wind speeds.

4.7. Discrete Distance Options

The discrete distance option was selected to model to the nearest public receptor. The nearest receptor is approximately 2,000 (610 meters) feet west of the emission source is Twin Falls county road N 4200 E.

5 APPLICABLE REGULATORY LIMITS

5.1 Methodology for Evaluation of Compliance with Standards

The modeled concentration of criteria pollutants will be compared to the National Ambient Air Quality Standards to demonstrate that the facility impacts will not cause or contribute to an exceedance of the NAAQS. The compliance standards for criteria pollutants are summarized in Table 5-1.

Table 5-1 Applicable Standards for Criteria Pollutants

Criteria Pollutant	NAAQS 24-hr (ug/m3)	NAAQS Annual (ug/m3)	NAAQS 1-hr (ug/m3)	NAAQS 8-hr (ug/m3)	NAAQS 3-hr (ug/m3)
Total PM	--	--			
PM_{10}	150	--			
$PM_{2.5}$	35	15			
NO_2	--	100			
SO_2	365	80	--		1,300
CO			40,000	10,000	
Lead					

SCREEN3 produces output for a one-hour average only. This one-hour average concentration must be adjusted to estimate the concentration for the appropriate averaging period. The one-hour average model output will be converted to averaging periods consistent with the standard for the pollutant modeled through the use of persistence factors presented in Table 5-2.

Table 5-2: Persistency conversion factors for SCREEN3

Averaging Period	Simple Terrain	Complex Terrain
3-hour	0.9	0.7
8-hour	0.7	
24-hour	0.4	0.15
Quarterly	0.13	
Annual	0.08 (for criteria pollutants) 0.125 (for carcinogenic TAPs, per IDAPA 58.01.01.210.03.a.i)	0.03 (for criteria pollutants) 0.125 (for carcinogenic TAPs, per IDAPA 58.01.01.210.03.a.i)

The modeled concentrations of the TAP emissions will be compared to their respective Acceptable Ambient Concentrations presented in IDAPA 58.01.01 Sections 585 and 586. The compliance standards for TAP emissions are summarized in Table 5-2.

Table 5-3: Applicable Standards for TAPs

TAP	AAC (ug/m3) 24-hr Avg	AACC (ug/m3) Annual Avg
Acetaldehyde		0.45
Acrolein	12.50	
Benzene		0.12
Dichloromethane		0.24
Formaldehyde		0.077
Isomers of Xylene	21,750	
Styrene	1,000	
Toluene	18,750	
Trichloroethylene	13,450	0.77
Vinyl Chloride		0.14

6 REFERENCES

EPA, 2000. *Meteorological Monitoring Guidance for Regulatory Modeling Applications*. EPA Publication No. EPA-454/R-99-005. U.S. Environmental Protection Agency, Research Triangle Park, NC.

EPA, 1995. *SCREEN3 Model User's Guide*. U.S. Environmental Protection Agency, Research Triangle Park, NC.

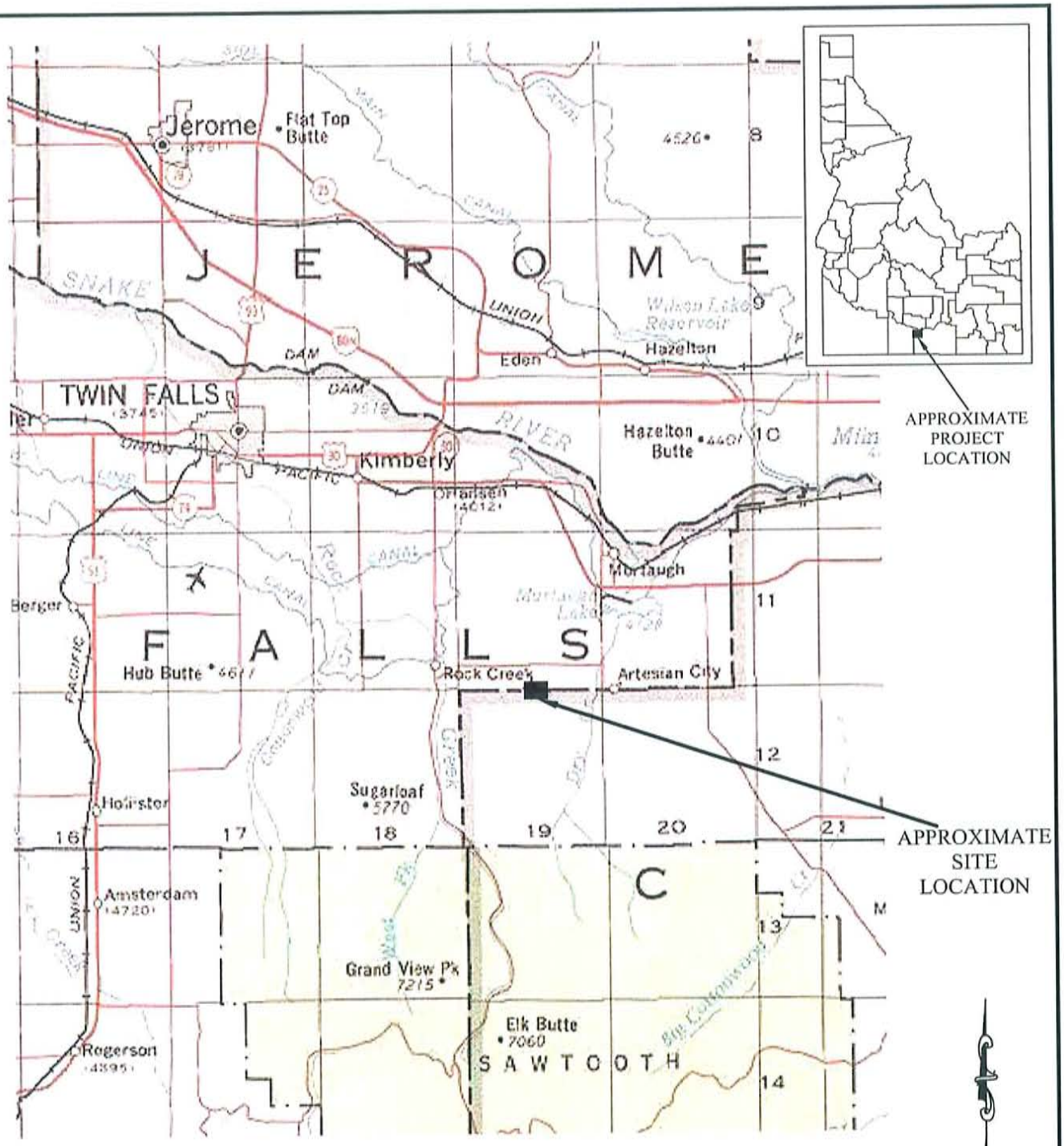
EPA's SCRAM Web site: http://www.epa.gov/scram001/index.htm.

IDAPA 58.01.01, et seq. *Rules for the Control of Air Pollution in Idaho.*

IDEQ, 2002. *State of Idaho Air Quality Modeling Guideline*, Doc. IDAQ-011 (rev. 1 12/31/02).

APPENDIX A

FIGURES



SOURCE: TOPO! © 2000 National Geographic Holdings

6 0 6
Scale in Miles

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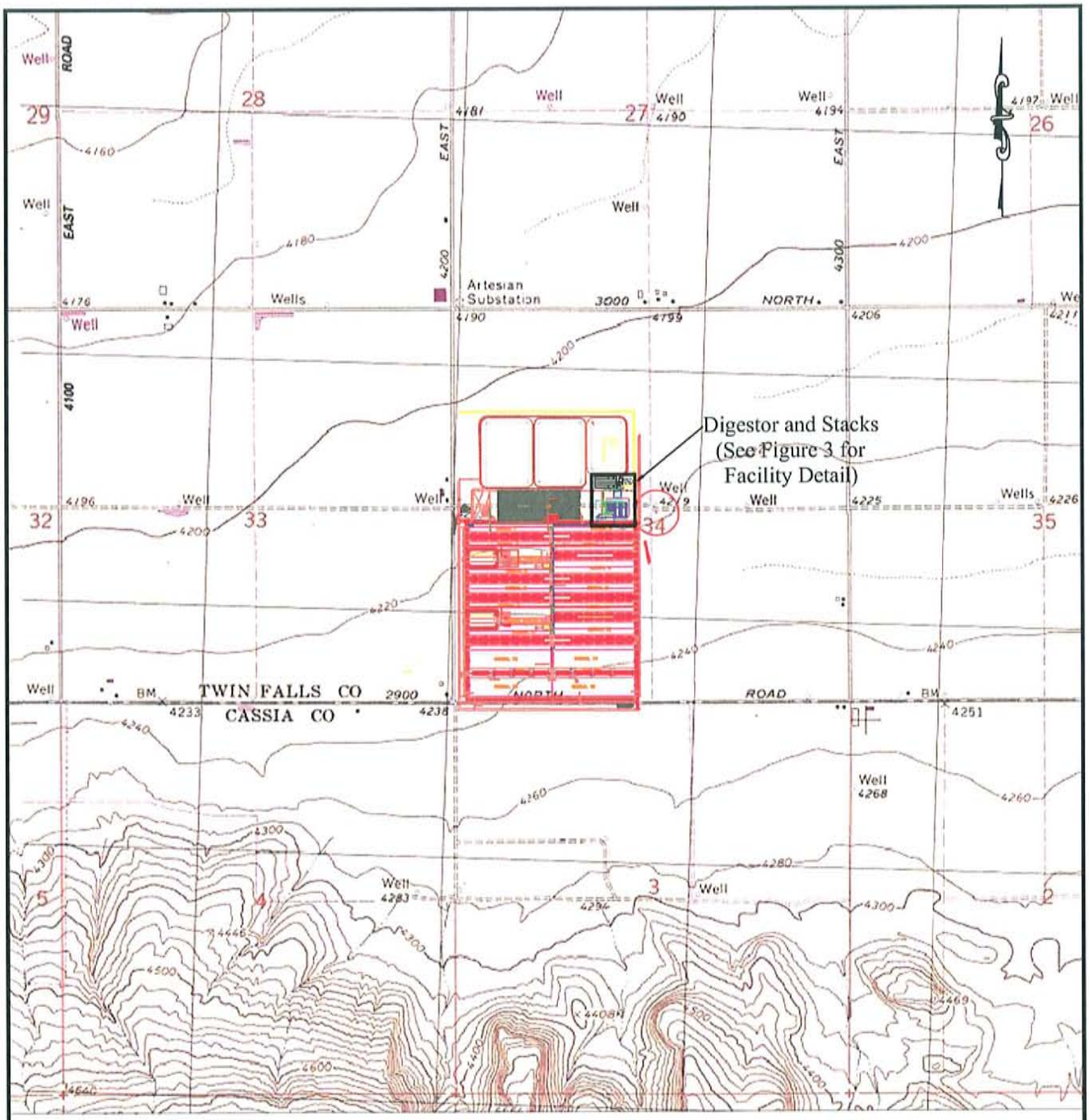
SITE LOCATION MAP

Manure System Air Modeling
2952 North 4200 East
Hansen, Idaho 83334

DRAWN BY: A. Kartchner
REVISED BY: A.Kartchner
CHECKED BY: A. Marshall
FIGURE 1

DRAWN: Oct 2007 | APPROVED BY: | PROJECT NO. 88861 | FILE NAME:



BASE MAP SOURCE: USGS 1:24,000 SCALE QUADRANGLE MAP: Murtaugh, Idaho 1992
FACILITY MAP SOURCE: Site Plan Dry Creek Dairy.dwg, provided by EAC Engineering, dated May 15, 2007.

1 0.5 0 0.5 1

APPROXIMATE SCALE IN MILES

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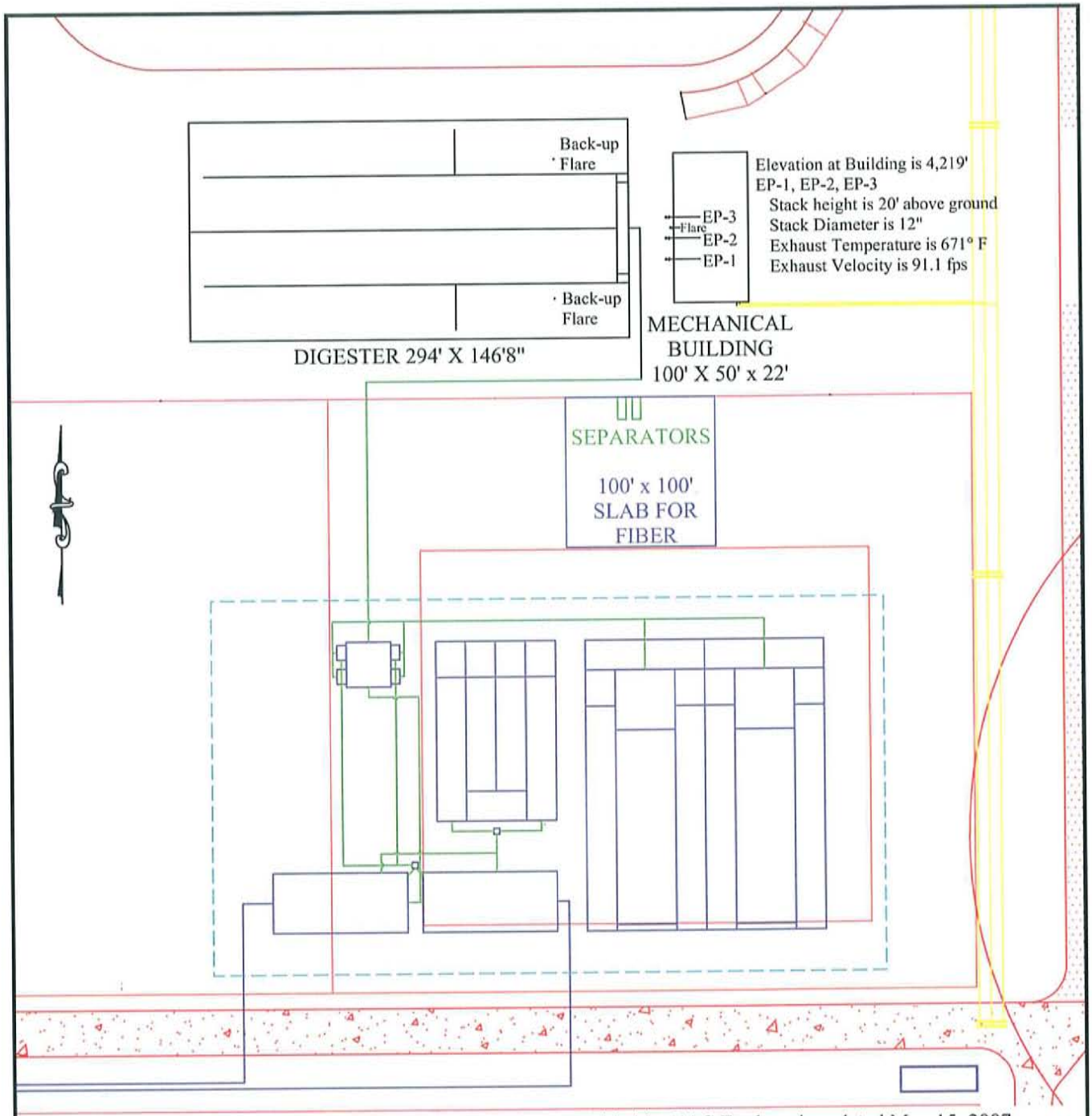
VICINITY MAP

Manure System Air Modeling
2952 North 4200 East
Hansen, Idaho 83334

DRAWN BY: A. Kartchner
REVISED BY: A. Kartchner
CHECKED BY: A. Marshall
FIGURE
2

DRAWN: Oct 2007 | APPROVED BY: | PROJECT NO. 88861 | FILE NAME:



FACILITY MAP SOURCE: Site Plan Dry Creek Dairy.dwg, provided by EAC Engineering, dated May 15, 2007.

100 0 100

Scale in Feet

KLEINFELDER

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FACILITY DETAIL

Manure System Air Modeling
2952 North 4200 East
Hansen, Idaho 83334

DRAWN BY: A. Kartchner
REVISED BY: A. Kartchner
CHECKED BY: A. Marshall
FIGURE
3

DRAWN: Oct 2007 | APPROVED BY: | PROJECT NO. 88861 | FILE NAME:

Appendix B

Modeling Protocol Checklist

Table B-1
Modeling Protocol Checklist for New Minor Sources or Minor Modifications

Checklist Item	Completed (yes / no)	Protocol Section
Introduction and Purpose	Yes	2
• General overview, facility description, terrain description	Yes	2.1
• Project Overview	Yes	2.2
• Goals of the air quality impact analysis (i.e., demonstrate compliance for a permit to construct or a Tier II operating permit)	Yes	2.3
• Applicable regulations and requirements	Yes	2.4
• Pollutants of concern	Yes	2.5
Emission and Source Data	Yes	3
• Facility processes and emission controls effected by the permitting action	Yes	3.1
• Include a list of emission points that will be included in the application. Present a table showing current actual and future allowable emission rates (in maximum pounds per hour tons per year) and the requested emission increase (future allowable minus current actual)	Yes	3.2
• Good engineering practice (GEP) stack-height analysis	Yes	3.3
• Facility layout: location of sources, buildings, and fence lines	Yes	3.4
• Source parameters (emissions rates, UTM coordinates, stack height, stack elevation, stack diameter, stack-gas exit velocity, and stack-gas exit temperature) for each new or modified emission point	Yes	3.5
• Methodology for including area and volume sources in the modeling analysis	Yes	3.6
• Methodology for including/excluding sources from the modeling analysis	Yes	3.7
Air Quality Modeling Methodology	Yes	4
• Model selection and justification	Yes	4.1
• Model setup and application - Model options (i.e., regulatory default) - *Terrain Options* - *Land-use analysis* - *Building Downwash* - *Choice of Meteorology* - *Discrete Distance Option*	Yes	4.2
• Elevation data - *Methodology for accounting for complex terrain*	n/a	

Table B-1 (Continued)
Modeling Protocol Checklist for New Minor Sources or Minor Modifications

Checklist Item	Completed (yes / no)	Protocol Section
• Receptor network - *Description of receptor grids – include methodology for ensuring the maximum concentration will be estimated* - *Discussion/justification of ambient air* - *Determination of receptor elevations*	n/a	
• Meteorological data - *Selection of meteorological databases – justification of appropriateness of meteorological data to area of interest* - *Meteorological data processing* - *Meteorological data analysis (e.g., wind rose)*	Yes	4.6
• Background concentrations	n/a	
Applicable Regulatory Limits	Yes	5
• Methodology for evaluation of compliance with standards (i.e., determination of design concentration)	Yes	5.1
• Full impact analysis - *TAPs analysis* - *NAAQS analysis*	Yes	5.1
• Presentation of results – state how the results of the modeling analysis will be displayed (i.e., list what information will be included)	Yes	5.1
References	Yes	6

Appendix C

Emission Calculations

Emission Calculations
Dry Creek Dairy, Hansen, Idaho
Three Genset Electrical Generators

Capacity Assumptions		
Power	3,171	bhp
Fuel consumption	6,570	btu/bhp-hour
Fuel input at capacity	20.8	MMBtu/hr

Pollutant	Emission factor (lb/MMbtu)	Data Source	Emissions	
			lbs/hr	tons/yr
PM10	9.99E-03	AP-42 Section 3.2, Table 3.2-2 (includes filterable and condensible)	0.21	0.91
PM2.5	9.99E-03		0.21	0.91
SO2	5.40E-01	Calc'd based on concentration of H2S in gas	11.3	49.3
NOx	3.36E-01	Vendor	7.0	30.6
CO	7.38E-01	Vendor	15.4	67.4
VOC	3.36E-01	Vendor	7.0	30.6
Lead	na	Vendor		
Acetaldehyde	5.80E-05	TTN clearing house, Internal combustion engines, commercial/insitutional digester gas, and reciprocating: POTW Digester Gas. December 2005	1.2E-03	5.3E-03
Acrolein	2.60E-05		5.4E-04	2.4E-03
Benzene	6.89E-04		1.4E-02	6.3E-02
Dichloromethane	1.00E-04		2.1E-03	9.1E-03
Formaldehyde	1.71E-03		3.6E-02	1.6E-01
Isomers of Xylene	1.36E-04		2.8E-03	1.2E-02
Styrene	5.26E-05		1.1E-03	4.8E-03
Toluene	2.62E-04		5.5E-03	2.4E-02
Trichloroethylene	2.00E-05		4.2E-04	1.8E-03
Vinyl Chloride	5.60E-05		1.2E-03	5.1E-03